EXECUTIVE SUMMARY

Introduction and Background

The Burgess Brothers Superfund Site (the Site) is located off Burgess Road in Bennington and Woodford, Vermont. The Superfund Site consists of a three-acre area located in the northeastern section of a 60-acre parcel owned by Clyde Burgess, Jr.

Groundwater in the vicinity of the Burgess Brothers Landfill is currently designated as Class III. Mr. Gerold Noyes, site Remedial Project Manager (RPM) for the Vermont Department of Environmental Correction (DEC), has reviewed conditions at the Site with the Burgess Brothers Steering Committee and is recommending that the groundwater in the vicinity of the Burgess Brothers Landfill be reclassified as Class IV. The Waste Management Division (WMD), representing the Secretary of the Agency of Natural Resources (ANR), will be the petitioner on behalf of the Settling Parties for the proposed groundwater reclassification. Class IV groundwater is classified as "not suitable as a source of potable water but suitable for some agricultural, industrial, and commercial use."

Groundwater reclassification is being proposed for a 12.43-acre area at the Burgess Brothers Landfill the following reasons:

- The use of groundwater is prohibited by institutional controls and, therefore, cannot be developed as a public water supply source
- The physical characteristics of the aquifer make it infeasible for use as a Class III water supply. The majority of the reclassification area is a landfill and the overburden aquifer is of low permeability, low yield, and low saturated thickness.
- Extensive groundwater quality data indicate that the overburden aquifer within the reclassification area has been contaminated above the VGES by the Landfill Area and Former Lagoon Cells

The site is and old sand and gravel pit, which has been used as a landfill since the early 1950s. Wastes disposed of in the landfill included construction debris, metals, and sludges that contained lead sludges, lead contaminated wastewater and spent solvents (PCE and TCE). The landfill ceased operation during the late 1970's or early 1980's.

The site was listed on the EPA National Priority List in March 1989. Numerous investigations have been performed at the site to evaluate environmental impacts from disposal operations that occurred in the Landfill Area and Former Lagoon Cells. A complete Remedial Investigation and Feasibility Study has been completed, a Human Health and Environmental Risk Assessment performed by EPA, a Record of Decision (ROD) issued by EPA.

The Burgess Brothers Steering Committee entered into a Consent Decree with EPA and the State of Vermont DEC for remediation of the site in September 1999. This Consent Decree requires remedial action and site monitoring for 30 years, which started in December 2000. Short term and long-term management requirements are outlined in the Demonstration of Compliance Plan, and the Operation and Maintenance Plan, which include an Environmental Monitoring Plan.

In summary, an SVE/air sparge system is currently operating in the Former Lagoon cell areas to remediate the primary source of groundwater contamination at the site. In addition, the landfill is capped and the cap system shall be maintained a minimum of thirty years. Based on groundwater modeling of the contaminant plume, the plume should be remediated at the compliance boundary, which is located within the groundwater reclassification area, in approximately eight years.

The EMP calls for semi-annual, annual or biannual groundwater sampling of specific wells and annual surface water and sediment sampling. Wells to be sampled include the groundwater reclassification boundary wells and numerous sentinel wells inside the reclassification area. These measures will ensure that Class III standards or better will be maintained at the border of the Class IV area.

Levels of VOCs and metals are currently below Class III standards (Vermont Primary Groundwater Enforcement Standards (VPESs)) at the groundwater reclassification boundary wells. Because of the remediation measures in place, contaminant levels should remain below the Class III standards at the groundwater reclassification boundary.

Hydrogeologic Setting and Model

The site geology consists of kame sand and ablation glacial till unconsolidated overburden, underlain by dense lodgment till, underlain by bedrock. The landfill material is contained within the capped area of the site.

Combined, the kame sand and ablation glacial till are up to 35 feet thick. The hydraulic gradient in the kame sand ranged from 10-30 feet per year and for the ablation glacial till 7 feet per year. The kame sand, which is the most permeable stratigraphic unit, is present predominately in the vicinity of the Landfill Area and Marshy Area, and pinches out towards the east south and west. The ablation glacial till layer is more clay rich, is variable in thickness and is present across the entire site.

Recharge to the shallow overburden aquifer is primarily through precipitation infiltrating surficial sand and gravel units. Groundwater flow in the overburden is generally from the landfill southeastward into the Marshy Area and southward. Harmon Hill located to the north and east of the groundwater reclassification are is a topographic and hydrogeologic barrier.

The lodgment till, which separates the kame sand and ablation glacial till from the bedrock, is 35 to 90 feet thick and is present across the entire reclassification area. The lodgment till is very dense, poorly sorted, and has very low permeability. Boring logs through this unit describe the unit as dry, suggesting that it is a confining layer and barrier to groundwater flow and contaminant migration.

Bedrock consists of weathered bedrock and competent bedrock. Impact from the landfill to the weathered and competent bedrock aquifers was not identified.

Groundwater and Surface Water Quality and Contaminant Fate and Transport

Groundwater

Groundwater analytical data collected from 12 environmental sampling events between 1993 and 2001 indicate that EPA Maximum Contaminant Levels (MCLs), the Vermont Primary Enforcement Standards (VPES) and Interim Cleanup Levels set by EPA and approved by DEC have been exceeded in the shallow overburden aquifer in most of the monitoring wells within and adjacent to the landfill, but within the boundaries of the proposed groundwater reclassification area. Predominate contaminates of concern at the site are chlorinated volatile organic compounds (VOCs), particularly, trichloroethene (TCE), tetrachloroethene (PCE), 1,2-dichloroethene (1,2-DCE), and vinyl chloride. Concentrations of Total VOCs within the landfill and adjacent contaminated areas ranged from ND to 51,087 μg/l.

Metals of concern at the site include arsenic, lead, manganese and thallium. Metals in groundwater are generally immobile and contained within the landfill. In the latest sampling events only thallium was detected above VPES. The detections of thallium are sporadic both spatially and temporally and are likely not associated with the landfill, but rather may be background or an artifact of sampling. The organic plume is controlling the extent of contaminated groundwater at the site.

VOCs and metals impacts are not identified in bedrock at the site.

Surface Water

VOCs detected in surface water include TCE, PCE and 1,2-DCE. VOCs are predominated detected in the toe of slope swale adjacent to the landifll cap. VOCs have historically been detected in the Unnamed Stream above risk based acceptable levels; however, in sampling conducted since the landfill closure activities were completed, the concentrations of VOCs have been below acceptable risked based levels in the Unnamed Stream.

The only metals detected above PLs in surface water were aluminum, iron and thallium. Elevated metals in surface water extend from the toe of slope swale into the Unnamed Stream.

Fate and Transport

Fate and transport characteristics of chlorinated VOCs indicate that these compounds may be mobilized in groundwater, but tend to volatize into the atmosphere from surface water. Metals in soils are generally of low solubility and low mobility in groundwater. Sampling data indicate that metals are generally contained within the landfill area. Groundwater flow in the overburden is towards the south-southeast and is the predominate direction of dissolved phase VOC transport in groundwater. Migration to the west of the landfill is limited and well defined based on the sampling history at the site.

Summary

In summary, the extent of impacted groundwater has been delineated and is unlikely to increase either laterally or vertically. Following is a summary of the groundwater conceptual model.

- The predominate direction of groundwater flow in the overburden aquifer is towards the east-southeast. Harmon Hill to the east and the groundwater discharge the Unnamed Stream control the downgradient extent of the groundwater plume. VOCs in groundwater volatize to the atmosphere as groundwater discharges to surface water. Therefore, the limit of the VOC plume is to the west of the break in slope with Harmon Hill and to the west of the Unnamed Stream, and is not likely to migrate beyond these hydraulic boundaries.

- The downgradient limit of contaminant migration towards the south in the overburden aquifer is at piezometer P-02.
- Contaminant migration towards the west in the overburden aquifer is limited and the downgradient edge of the plume is upgradient and to the east of the W-26T well and piezometer P-03.
- Source control measures should reduce the extent of contaminant migration towards the south and west.
- The lodgment till is a barrier to downward vertical migration of contaminants in groundwater from the overburden aquifer to the weathered and competent bedrock aquifers. Contaminants attributed to the landfill were not detected in the bedrock aquifers above MCLs and VPES.
- MCLs and VPES have clearly been exceeded within the groundwater reclassification area and statistical analysis by calculation of a 95% confidence level is not necessary.

Evaluation Criteria

The VGPRS-Final Rule specifies evaluation criteria to be used to assess whether reclassification of groundwater is appropriate. These criteria, as they pertain to this petition are discussed below.

<u>Use of Groundwater as a Public Water Supply Source</u>
The groundwater in the reclassification area is unsuitable as a water supply because it is not potable, low yielding, and there will be an environmental easement against its use.

<u>Extent of Activity that Poses a Risk to Groundwater</u>
The shallow overburden aquifer at the Burgess Brothers Superfund Site has been impacted as a result of historical waste disposal practices and infiltration of precipitation through the landfill. Impacts to the shallow overburden aquifer are limited to the landfill area and areas east, south and southwest of the landfill, including the Marshy Area and West of the Landfill Area. These impacted areas are all included within the proposed reclassification area. Impacts to the bedrock are not identified.

Source control measures have been implemented to limit further impact to groundwater and improve groundwater quality:

- Construction and maintenance of a multi-barrier cap over the Landfill Area
- Construction and maintenance of a permeable cover over the soils in the Marshy Area
- Treatment of the soils and groundwater within the Former Lagoon cells using SVE and air sparging

Current Water Quality Conditions of Groundwater
Groundwater data from the RI, Supplemental RI, Demonstration of Compliance, and Groundwater Reclassification indicate that concentrations of VOCs and metals within the groundwater reclassification area exceed VPES. The extents of impacts to groundwater above VPES are contained within the groundwater reclassification area.

Availability of Groundwater for Beneficial Use
Groundwater within the reclassification area is unlikely to be beneficially used as either Class III or Class IV. Hydraulic conductivities within the overburden aquifer are low. In most areas if groundwater, either overburden or bedrock, was purged at flow rates greater that 75 ml/min or 0.02 gallons/minute, then drawdown was observed in the well. Therefore, groundwater yields from the saturated overburden are considered to be inadequate for domestic water supply, commercial/industrial, irrigation, or agricultural use. In addition, institutional controls as part of the site remedy prohibit groundwater use.

Impact Consequences and Alternative Water Supply
The primary consequence of impacts to groundwater in the proposed reclassification area is that groundwater in the immediate vicinity of the Burgess Brother Landfill including adjacent drainage swales is unusable as a potable water source. Since almost the entire reclassification area is a closed landfill and Burgess Brothers owns the entire parcel within the groundwater reclassification area, it is unlikely that there will be a need for a potable water supply in the groundwater reclassification area. However, if a public water supply were necessary, then a potable water supply connection is available at the Burgess Brothers offices located 2000 feet southwest of the reclassification area.

Classification of Adjacent Surface Water
The surface water bodies within the reclassification area include small hillside drainage swales, and the upper portion of the Unnamed Stream.

Flow in the drainage swales is frequently dry in late summer and fall. Flow within the Unnamed Stream is also small. Therefore, it is unlikely that the drainage swales or the Unnamed Stream would be used as a public water supply, or for irrigation, agricultural purposes, or swimming and recreation.

Probability for Use as a Public Water Supply Source
The probability that the proposed reclassification area will be used as a public water supply source is low for the following reasons:

- The use of groundwater is prohibited by institutional controls and, therefore, cannot be developed a a public water supply source
- The majority of the reclassification area is a landfill
- Groundwater quality data indicate that the overburden aquifer within the reclassification area has been impacted by the Landfill Area and Former Lagoon Cells
- The overburden aquifer within the reclassification area is of low yield and low saturated thickness and would be inadequate as a water supply source
- Burgess Brothers owns the entire parcel within the groundwater reclassification area

Groundwater Reclassification Boundary

The Groundwater Reclassification Boundary is a 12.43-acre area. The boundary was established consistent with the criteria presented in the "Procedure for Class IV Groundwater Reclassification" dated November 12, 2000. The Area of Contaminated Groundwater is defined by projecting a vertical line to the ground surface around the outermost limit of where groundwater quality for any compound that exceeded its Vermont Groundwater standards (VPES). The groundwater sampling data clearly demonstrates that overall the groundwater contaminant plume has not changed in shape or concentration over the eight years that sampling has occurred. The proposed Groundwater Reclassification area includes all subsurface geologic units.

Conclusions

Reclassification of the groundwater from Class III to Class IV is being recommended for the following reasons:

1. Elevated concentrations of chlorinated VOCs and dissolved metals are present above VGES within the proposed reclassification zone.

2. Groundwater from the proposed reclassification area is not currently used as a public water supply source and has very low potential for ever being considered as a public water supply source for the following reasons:

   - The use of groundwater is prohibited by institutional controls and, therefore, cannot be developed as a public water supply source
   - The majority of the reclassification area is a landfill
   - Extensive groundwater quality data indicate that the overburden aquifer within the reclassification area has been contaminated above the VGES by the Landfill Area and Former Lagoon Cells
   - The overburden aquifer within the reclassification area is of low yield and low saturated thickness and would be inadequate as a water supply source
   - The extent of impact is contained within the groundwater reclassification area and is likely to be contained within that area because of source control measures

3. Groundwater within the reclassification area is unlikely to be beneficially used as either Class III or Class IV. The saturated thickness of the overburden aquifer within the groundwater reclassification area is small and hydraulic conductivities are low.

4. Municipal water supply is available to areas downgradient of the reclassification area.

5. Burgess Brothers owns all of the property within the groundwater reclassification area. This property will likely not be sold, because it is a Landfill Superfund Site, located in an area where uncontaminated property is readily available.

2.4 *SITE HISTORY*

Sand and gravel mining operations at the site began in the 1940s. Beginning in the early 1950s, the site was used as a metal salvage facility, and as a disposal area for construction debris, metals, sludges and rejected reserve energizer batteries. The Battery Products Division of Union Carbide disposed of liquid waste and sludge in the Former Lagoon Cells (an unlined bermed pit) from approximately 1967 to 1976. These wastes reportedly consisted of lead sludges, lead contaminated wastewater, spent solvents (PCE and TCE) in 55-gallon drums, and reserve battery waste. Manganese dioxide cells (containing zinc and mercury) were also disposed. Ralston Purina Company (Eveready Battery Co. Inc.) later purchased the Battery Products Division of Union Carbide in 1986. The landfill ceased operation during the late 1970's or early 1980's.

The site was listed on the EPA National Priority List (NPL) in March 1989. Numerous investigations have been performed at the site to evaluate environmental impacts from disposal operations that occurred in the Landfill Area and Former Lagoon Cells. The Burgess Brothers Steering Committee entered into a Consent Decree (Docket No. 2(99-CV-194)) with EPA and the State of Vermont Department of Environmental Conservation for remdiation of the site.

A listing of previous site investigation activities is provided below. A more detailed discussion of the findings of these investigations is provided in Section 1.1 of the RI Report.

Summary of Previous Investigation Activities

Date	Lead	Purpose/Activity
1985	Eveready	Installed groundwater monitoring wells to characterize shallow subsurface conditions. Collected soil samples.
2/89	EPA	Collected surface water samples.
3/89	Eveready	Sampled existing monitoring wells and collected surface water samples.
4/89	EPA	Conducted soil gas survey and soil sampling in lagoon and marshy areas.
12/91 - 1/92	Settling Parties	Conducted Limited Field Investigation consisting of records review, ground-penetrating radar, air sampling and soil vapor screening.
9/92 - 8/94	Settling Parties	Conducted Phase 1A and 1B RI consisting of seismic refraction survey, soil gas sampling, installation of test pits, air monitoring, installation of monitoring wells and an ecological assessment. In addition, sampled and analyzed soils, surface water, sediments, leachate/seeps and groundwater.
11/94	Settling Parties	Long Term Monitoring Program (LTMP) sampling of groundwater, surface water, and leachate sampling. Groundwater sampling conducted using conventional purging and sampling techniques.
5/95- 11/95	Settling Parties	Two rounds of LTMP sampling performed (Spring and Fall), including groundwater, surface water, and leachate sampling. Groundwater sampling conducted using low flow purging and sampling techniques.
5/96 - 10/96	Settling Parties	Two rounds of LTMP sampling of groundwater and surface water (Spring and Fall), based on a reduced LTMP scope. Groundwater samples collected using low flow purging and sampling techniques.
7/96	Settling Parties	Completion of the RI Report
6/96 - 2/97	Settling Parties	Supplemental RI Report prepared to document and evaluate the results of the LTMP sampling.
3/99 - 7/99	Settling Parties	Installation, gauging and sampling of piezometers and monitoring wells in support of a Demonstration of Compliance Plan and Groundwater Reclassification Petition
12/99 – 9/00	Settling Parties	Two rounds of groundwater, surface water and sediment sampling in support of Demonstration of Compliance and Groundwater Reclassification

In addition, a Feasibility Study was conducted to identify and evaluate remedial technologies to address both source control and management of migration remedial action objectives. The results of the FS were used to prepare EPA's Record of Decision (ROD), which specifies the remedial actions to be implemented at the disposal site.

The EPA issued a ROD for the site dated September 25, 1998. The EPA selected a remedy of source control and groundwater monitoring to address risks posed by the site. Source control remedies selected include:

- Institutional controls, such as reclassification of the groundwater, an environmental easement coincident with the reclassification boundary, and access restrictions
- Construction and maintenance of a multi-barrier cap over the Landfill Area
- Construction and maintenance of a permeable cover over the Marshy Area
- Treatment of Former Lagoon soils using a combination of soil vapor extraction (SVE) and air sparging

The Landfill Area cap and Marshy Area cover systems were constructed in Summer and Fall 1999. The SVE and air sparging system began operation in December 2000. Natural attenuation was the selected remedy for management of migration and groundwater and surface water monitoring will be performed to document groundwater quality.

Two rounds of Post-Closure Environmental Monitoring have been performed at the site: the baseline sampling event in December 1999, conducted after substantial completion of the landfill cap; and a post-construction sampling event, conducted in April 2001 four months after startup of the SVE/air sparge system. These two sampling events provide the most recent water quality data for the Site and will be the primary data used to discuss water quality under this Groundwater Reclassification Petition.

3.0 HYDROGEOLOGIC SETTING

3.1 INTRODUCTION

The hydrogeologic setting was evaluated during the RI and Supplemental RI. The subsurface geology was investigated by installation and sampling of soil borings, rock coring and excavation of test pits. Hydrology was investigated through installation of nested monitoring well clusters, water level measurements and aquifer testing (slug tests). Table 1 summarizes the monitoring wells installed, the stratigraphic screened interval, the hydrogeologic location, the years sampled, the number of times sampled and the maximum concentrations of total VOCs observed.

3.2 HYDROGEOLOGIC UNITS

A conceptual model of the site is presented in the RI Report. In summary, the site geology consists of kame sand and ablation glacial till unconsolidated overburden, underlain by dense lodgement till, underlain by bedrock. Following is a summary of the hydrogeologic units:

Unit	Thickness (feet)	Mean Horizontal K (ft/day)	Horizontal Velocity (ft/year)	Description
Landfill Material	0-18			Miscellaneous paper, wood, municipal trash, cement blocks, and appliances with local areas (lagoons) containing battery waste sludges
Kame Sand	0-36	0.12/0.19(a)	10-30	Loose to medium dense fine sand with trace amounts of silt and/or gravel
Ablation Glacial Till	4-18	0.05	7	Medium dense till, transitional with the kame sand, consisting of medium to fine sandy silt with gravel and clay; generally poorly sorted
Lodgemen t Till	35-90	NC	NC	Dense, poorly sorted till, consisting of sands and silts with clay, boulders, and gravel.
Weathered Bedrock	180-360	0.19	5-8	Weathered schist and gneiss and contains highly weathered layers of silty clay to clay, or loose medium to fine sand, commonly referred to as "ochre," interbedded with less weathered schist and gneiss.
Competent Bedrock		1.67	NC	Massive to thickly bedded quartzite with frequent high angle fractures.

Notes: NC = not calculated K = Hydraulic Conductivity
(a) = Values listed are for the kame sand in the Landfill Area/Marshy Area, respectively

Combined, the kame sand and ablation glacial till are up to 35 feet thick. The boundary between the kame sand and ablation till is transitional. The kame sand is more sand rich than the ablation till, which is more poorly sorted and contains more silt and gravel. The hydraulic conductivities of the kame sand and ablation glacial till are similar, although the ablation glacial till is slightly lower.

The lodgement till, which separates the kame sand and ablation glacial till from the bedrock, is 35 to 90 feet thick. The lodgement till is very dense, poorly sorted, and has very low permeability. Boring logs through this unit describe the unit as dry, suggesting that it is a barrier to groundwater flow and contaminant migration.

Bedrock consists of weathered bedrock and competent bedrock. The weathered bedrock consists of weathered schist and gneiss and contains highly weathered layers of silty clay to clay, or loose medium to fine sand, commonly referred to as "ochre," interbedded with less weathered schist and gneiss. The competent bedrock consists of massive to thickly bedded quartzite with frequent high angle fractures.

Porosity in the weathered bedrock units is associated with the weathered layers between the bedrock and fractures in the bedrock. Porosity in the competent bedrock occurs mainly in fractures.

3.3 *CONCEPTUAL HYDROGEOLOGIC MODEL*

The hydrogeologic units of significance at the Burgess Brothers Superfund Site for groundwater reclassification purposes is the shallow overburden aquifer, consisting of the kame sand and ablation glacial till. The lodgement till, which separates the shallow overburden aquifer from the bedrock aquifer, is dense, of low permeability and is a confining layer separating the two aquifers. The top of the lodgement till forms the lower boundary of the shallow overburden aquifer.

Recharge to the shallow overburden aquifer is primarily through precipitation infiltrating surficial sand and gravel units. Groundwater flow in the kame sand and ablation glacial till is generally from the landfill southeastward into the Marshy Area and southward. Groundwater flow maps for the kame sand and ablation glacial till are included as Figures 6 and 7, respectively.

Based on groundwater quality data and groundwater flow maps, Harmon Hill and the Unnamed Stream are barriers to lateral contaminant migration in the kame sand and ablation glacial till. Prior to landfill capping, former drainage Swale 2, located along the landfill base, was a barrier to contaminant migration. As part of the Landfill and Marshy Area capping activities, flow from Swale 2 was diverted to the east and south and Swale 2 no longer exists. As a result, the break in slope with Harmon Hill has become the groundwater divide.

Groundwater elevation data indicate generally upward gradients in the kame sand and ablation glacial till in the Marshy Area, with groundwater discharging to surface water; vertical gradients in the Landfill Area appear to be slightly upward.

Groundwater flow in the bedrock aquifer is towards the west-southwest, as shown in Figure 8. Impact from the Burgess Brothers Superfund Site to the weathered and competent bedrock aquifers was not identified.

Figures 9 and 10 are geologic cross-sections that transect the site from north to south and east to west, respectively. These cross-sections show that the landfill material is contained within the capped area of the site. The kame sand, which is the most permeable stratigraphic unit, is present predominately in the vicinity of the Landfill Area and Marshy Area, and pinches out towards the east south and west. The thickest section of kame sand is located in the vicinity of W-01DI to the north of the groundwater reclassification area. The ablation glacial till layer is variable in thickness and is present across the entire site. These sections also show that a thick section of lodgement till is continuous across the site. The top of bedrock surface generally slopes from north to south.

4.0 GROUNDWATER AND SURFACE WATER QUALITY AND CONTAMINANT FATE AND TRANSPORT

4.1 GROUNDWATER QUALITY

4.1.1 Introduction

A total of 12 rounds of groundwater samples have been collected at the Burgess Brothers Superfund Site under the RI, Supplemental RI, Long Term Monitoring Plan, Demonstration of Compliance and Groundwater Reclassification. The most recent sampling event was April 2001. Summary tables of the laboratory analytical results for groundwater samples are presented in Appendix B. The data from the two Post Closure Environmental Monitoring sampling events are compiled in separate tables from the historical data. At a minimum, these tables include the following:

- the Interim Cleanup Level (ICL) as defined in the DOCP
- all compounds/elements for which an ICL exists, as defined in the DOCP, provided the compound has been detected above method detection limits
- detections of each compound/element grouped by aquifer and well location, including all historical sampling data

Complete data tables for the two most recent sampling events under the Post-Closure Environmental Monitoring Plan tables are included in Appendix C. These tables include all non-detect compounds, serial dilutions performed on any samples, and results of field Quality Assurance/Quality Control (QA/QC) samples. Full CLP laboratory deliverables for all data since 1995 are on file with the EPA. These documents can be provided upon request.

Figure 3 shows the existing monitoring wells and monitoring wells that were sampled historically, but have since been abandoned. The two most recent sampling events, performed under the Post-Closure Environmental Monitoring Plan, include only currently existing monitoring wells. Historical groundwater sampling under the RI and Supplemental RI included historic wells and existing wells. As indicated in the RI and Supplemental RI, levels of VOCs and inorganics are detected in the overburden above MCLs or VPES. There are no impacts to the bedrock aquifers.

The nature and extent of contamination in groundwater is presented by general stratigraphic and hydrogeologic units; the overburden, which includes the kame sand and ablation glacial till, and bedrock. These two stratigraphic units are separated by the thick lodgement till, which separates the two units and is a barrier to vertical contaminant migration.

4.1.2 *Laboratory Analytical Methods*

Groundwater samples for VOCs were analyzed by EPA Method OLM03.2, which is the method that EPA has required throughout the RI, Supplemental RI and PCEM programs. This method was also approved by the State of Vermont. The laboratory Contact Required Quantitation Limit (CRQL) for VOCs under this method is 10 μg/l. This is above the VGES for the following compounds of concern: vinyl chloride, methylene chloride, 1,1-dichloroethene, chloroform, 1,2-dichloroethane, trichloroethene, benzene, and tetrachloroethene. The laboratory provided instrument detection limit information for the OLM03.2 method. The instrument detection limit is lower than the VGES for all compounds except vinyl chloride. The VGES for vinyl chloride is 2 μg/l. The range of instrument detection limits provided by the lab for vinyl chloride ranged from 2.28 to 3.17 μg/l. Given the instrument detection limits provided by the laboratory and the extensive spatial and temporal sampling conducted at the site, the VOC data included in this Groundwater Reclassification Petition is sufficient to document that:

- contamination at the site has clearly exceeded VGES
- the Area of Contaminated Groundwater is clearly defined
- groundwater quality at the Groundwater Reclassification Boundary is below VGES.

4.1.3 *Nature and Extent of Organics Detected Above MCLs or VPES*

Overburden

Groundwater Reclassification and Demonstration of Compliance Piezometer Installation Results

The RI and Supplemental RI identified VOC impacts to groundwater as far south as W-09S1. In order to delineate the extent of the plume towards the south, southeast, and southwest in support of this Groundwater Reclassification Petition, a total of five piezometers and one monitoring well were installed downgradient of W-09S1, as shown on Figure 3. P-01, P-02, P-03, P-04, P-08 and W-28T were analyzed in the field for trichloroethene (TCE), tetrachloroethene (PCE), 1,2-dichlorethene (DCE) and benzene. Samples were also submitted for laboratory analysis of VOCs by EPA Method 8260. Appendix D includes a table summarizing the field GC and laboratory analytical results. As indicated in this table, VOCs were detected at P-01 and P-02 above MCLs and VPES, delineating the extent of the plume towards the south, southeast and southwest. VOCs were below VPES and MCLs at P-03, P-04, P-08 and W-28T.

The results of the piezometer sampling and groundwater flow data were used to locate groundwater monitoring well locations so that the degree and extent of contamination could be defined. Two additional downgradient groundwater monitoring wells were installed: W-30T, at the south end of the plume, and W-29T, on the east bank of the Unnamed Stream. W-28T, installed under the Piezometer program, is also retained for Groundwater Reclassification purposes.

As part of the Demonstration of Compliance and Groundwater Reclassification assessment activities, two piezometers, P-05 and P-06, were installed in the Soil Staging Area to confirm the extent of impact to the north. Based on field screening with a GC and laboratory analyses for VOCs by EPA Method 8260, the concentrations of VOCs in both of these piezometers were below MCLs and VPES.

As requested by EPA and Vt. DEC, piezometer P-06 is being used for Demonstration of Compliance and Groundwater Reclassification purposes to document the limits of contamination to the northwest.

Overall Results

The table below summarizes the maximum concentration of specific VOCs detected above MCLs or VPES in the kame sand/ablation glacial till, by area, and indicates the well location where the maximum was detected.

Compound	ICL/VPES (µg/l)	*Maximum Concentration in µg/l* Soil Staging Area	Hillside Area	Landfill Area	Marshy Area	West of Landfill Area	East of Unnamed Stream
Vinyl Chloride	2/2	-	-	2,000 W-TP12*	2,300 W-11S1*	3 W-09S1	-
Methylene Chloride	5/5	-	-	22 W-TP12*	150 W-22T*	-	-
Benzene	5/5	7 W-07	-	-	550 W-02*	-	-
1,1-DCE	7/7	-	-	360 W-TP12*	620 W-02*	-	-
Total 1,2-DCE	70/100 (a)	-	-	8,700 SBW-21*	22,000 W-03	200 W-25S1	-
1,2-DCA	5/5	-	-	25 SBW-21*	22 W-22T*	-	-
TCE	5/5	20 W-07S1	-	27,000 W-TP12*	40,000 W-22S1*	1400 W-25S1	-
PCE	5/0.7	-	-	21,000 W-TP12*	10,000 W-03	570 W-25S1	-
Chloro-benzene	100/100	-	-	-	580 W-02*	-	-

Notes: "-" Indicates that the compound was not detected above MCLs or VPES
* This well was abandoned as part of the landfill closure.
(a) The standard is 70 µg/l for cis-1,2-DCE and 100 µg/l for trans-1,2-DCE

Following is a discussion of groundwater quality results by area.

Upgradient Area

VOCs are not detected in the Upgradient Area well W-01 above method detection limits.

Landfill Area and Marshy Area

As shown in the above table, the highest concentrations of VOCs are detected within the Landfill Area and Marshy Area. The range of total VOCs detected in the Landfill Area is 9580 to 51,262 µg/l. The range of total VOCs in the Marshy Area is Not Detected to 44,400 μg/l. The southeastern edge of the VOC plume in the kame sand/ablation glacial till is just downslope of the W-06D monitoring well, at the break in slope between the landfill and Harmon Hill. Prior to landfill closure construction, the former drainage Swale 2 was a groundwater divide and barrier to contaminant migration. This swale has been diverted across Harmon Hill, upslope and to the east of the landfill. Therefore, the limits of the plume have shifted slightly eastward to the break in slope with Harmon Hill.

Hillside Area

VOCs were not detected in any of the Hillside Area wells.

East of the Unnamed Stream

VOCs were not detected above method detection limits in wells W-28T and W-29T, located to the east of the Unnamed Stream.

West of the Landfill Area

In the West of the Landfill Area, VOC impacts to groundwater above MCLs or VPES were identified as far south and downgradient as P-01. Levels of trichloroethene, 200 μg/L, and tetrachloroethene (PCE), 48 μg/L, were detected at P-01. VOCs were not detected above method detection limits at W-30T, which is located 200 feet south of P-01.

West of the Landfill VOCs were not detected at location W-26T above MCLs or VPES. VOCs were detected above MCLs or VPES at locations W-27S1, W-27T, W-08S1, W-25S1 and W-09S1. Therefore, the western limit of the VOC plume in the kame sand/ablation glacial till is between the landfill road and W-26T.

Soil Staging Area

The Soil Staging Area, located upgradient or cross-gradient of the landfill, was used as a fuel tank salvage area. Historically, VOCs detected in the Soil Staging Area (W-07S1) consisted primarily of petroleum related VOCs (benzene, toluene, ethylbenzene, and xylene (BTEX)) compounds, with the exception of 1,1,1-trichloroethane (1,1,1-TCA) and TCE.

P-06 is being used to document the extent of impact to the groundwater in the Soil Staging Area and to the northwest of the landfill. VOCs were not detected above method detection limits at P-06 in either the December 1999 or July 2000 sampling events.

Summary

In summary, VOCs are not detected in the Upgradient Area, Hillside Area or East of the Unnamed Stream Area above method detection limits. The lateral extent of VOC impacts to groundwater is within the Soil Staging Area, Landfill Area, West of the Landfill Area, and Marshy Area. With the exception of the Soil Staging Area, the source of VOCs in groundwater is the Landfill Area, and in particular the Former Lagoon Cells.

Bedrock

As discussed previously, the bedrock aquifer is monitored by shallow and deep weathered bedrock wells and competent bedrock wells. VOCs were detected in the bedrock aquifer above MCLs or VPES at three well locations, W-04SI, W-07SI, and W-09B. Two VOCs were detected above MCLs or VPES in the bedrock aquifer, TCE and PCE. W-07SI and W-09B have been sampled 9 times and W-04SI has been sampled 10 times. VOCs were detected in these wells at concentrations above MCLs or VPES during only one sampling event. VOCs were not detected in subsequent sampling events. Therefore, the VOC detections above MCLs or VPES in bedrock are probably not considered to be representative of aquifer conditions, but rather may be due to laboratory or field sampling errors and not representative of groundwater quality.

4.1.4 Nature and Extent of Inorganics Detected Above MCLs or VPES

Overburden Aquifer

In accordance with requirements by EPA, evaluation of groundwater quality for inorganics is based on unfiltered low flow purge and sampling data. The following table summarizes the maximum concentration of metals detected above MCLs or VPES in the kame sand/ablation glacial till, by area, and indicates that monitoring well location where the maximum was detected.

Element	*ICL/VPES (µg/l)*	*Upgradient*	*Soil Staging*	*Hillside*	*Landfill*	*Marshy*	*West of Landfill*	*Down-gradient*
		Maximum Concentration in µg/l						
Iron	NSA/300*	-	-	-	no data representative	128,000 W-11S1	180,000 W-25S1	-
Manganese	840(a)/840	-	-	-	no data representative	5,220 W-22T	8,860 W-25S1	-
Thallium	2/2	-	-	-	no data representative	6.4 W-11S1	6.3 W-25S1	-

Notes: - = concentrations of metals in this area were either not detected or detected at concentrations below MCLs or VPES
* = the standard is a secondary VPES
NSA = no standard available
(a) = EPA derived risk based drinking water standard.

This table is based on only representative data. Groundwater data for both Landfill Area wells, W-TP12 and SBW-21, were considered non-representative. For comparison purposes, concentrations of chromium, iron, lead, manganese, nickel and thallium were detected from wells within the Landfill Area and Former Lagoon Cells, above MCLs or VPES. These results are biased high, because the sample turbidity and aluminum concentration for these wells was high. As indicated in the above table, iron, manganese and thallium were detected in wells beyond the limits of the landfill above MCLs.

The lateral extent of the metals plume, with the exception of iron, manganese and thallium, is contained primarily within the Landfill Area. Iron, manganese and thallium were detected in the Marshy Area and West of the Landfill Area above MCLs or VPES. Based on historical data, the following conclusions are made:

- The lateral extent of the manganese plume is within the Marshy Area, west of the break in slope with Harmon Hill (120 feet southeast of the Former Lagoon Cells); and south of the Former Lagoon Cells, to the W-25 and W-09 clusters (300 feet southeast of the Former Lagoon Cells).
- The iron plume extends from the Landfill Area and Former Lagoon Cells into the Marshy Area and West of the Landfill Area. Iron was detected in the Marshy Area at W-06D, east of the break in slope with Harmon Hill.

- The distribution of thallium in groundwater is less widespread than manganese. Beyond the landfill, thallium was only detected in one Marshy Area well, W-11S1, and south of the Former Lagoon Cells, at the W-25 and W-09 clusters.

The concentrations of metals in groundwater were below ICLs at all groundwater reclassification well locations for the April 2001 sampling event.

Bedrock Aquifer

Iron was the only metal detected in the shallow and deep weathered bedrock or competent bedrock above MCLs or VPES, based on representative data. Iron is a common naturally occurring element in bedrock. The shallow weathered bedrock is described as having "ocher" layers consisting of weathered quartz sandstone or arkosic quartz sandstone, with highly weathered layers of silty-clay to clay, or loose medium to fine sand. This would be a natural source of iron in bedrock.

4.1.5 Comparison of Organic and Inorganic Plumes

The organic plume consists of chlorinated VOCs. The Area of Contaminated Groundwater is defined by the limit of the organic plume and is shown on Figure 11. As shown, the boundary for the Area of Contaminated Groundwater is defined by the limit of the VOC plume.

The inorganic plume includes arsenic, lead, manganese and thallium. Levels of metals above VGES are contained within the landfill. The metals in soil are generally insoluble and immobile. The only metal detected in groundwater above VGES in existing wells onsite is thallium. The levels of thallium are near the instrument detection limits and the VGES of 2 μg/l. The detections of thallium are sporadic and thallium is detected in wells upgradient as wells as downgradient and cross-gradient of the site. Therefore, thallium in groundwater is likely not associated with the site, but rather is an artifact of sampling or naturally occurring.

4.1.6 Statistical Analysis of Data

The Groundwater Protection Rule and Strategy Section 12-706(2) states that, in determining if an enforcement standard is reached or exceeded, *"the Secretary may utilize or may require the use of generally accepted statistical methods which provide a statistical 95% level of confidence that the standard has been reached or exceeded…When sampling clearly indicates the Groundwater Enforcement Standards have been or will be met or exceeded, the Secretary may* *determine that the standard has been reached or exceeded without calculating a 95% confidence level."*

Numerous groundwater sampling events have been completed at the Site (a total of 10 complete rounds and 7 partial rounds) as part of the RI, Supplemental RI, Long Term Monitoring Plan, Demonstration of Compliance and Groundwater Reclassification. Based on these sampling events, MCLs and VPES have been consistently exceeded at the Site, and a 95% statistical confidence limit has not been considered necessary because of the extensive special and temporal sampling that has been performed.

4.1.7 *Summary*

The extent of impacted groundwater has been delineated and is unlikely to increase either laterally or vertically. Following is a summary of the groundwater quality characterization.

- The predominate direction of groundwater flow in the overburden aquifer is towards the east-southeast. Harmon Hill to the east and the groundwater discharge the Unnamed Stream control the downgradient extent of the groundwater plume. VOCs in groundwater volatize to the atmosphere as groundwater discharges to surface water. Therefore, the limit of the VOC plume is to the west of the break in slope with Harmon Hill and to the west of the Unnamed Stream, and is not likely to migrate beyond these hydraulic boundaries.
- The downgradient limit of contaminant migration towards the south in the overburden aquifer is at piezometer P-01.
- Contaminant migration towards the west in the overburden aquifer is limited and the downgradient edge of the plume is upgradient and to the east of the W-26T well and piezometer P-03.
- Source control measures should reduce the extent of contaminant migration towards the south and west.
- The lodgement till is a barrier to downward vertical migration of contaminants in groundwater from the overburden aquifer to the weathered and competent bedrock aquifers. Contaminants attributed to the landfill were not detected in the bedrock aquifers above MCLs and VPES.
- MCLs and VPES have been exceeded within the groundwater reclassification area and statistical analysis by calculation of a 95% confidence level is not necessary.

4.2 SURFACE WATER QUALITY

Nine rounds of surface water sampling have been conducted at the site. Summary tables of the laboratory analytical results for surface water samples are presented in Appendix B. The data included here is the data submitted under the Post-Closure Environmental Monitoring Plan. Samples were collected from additional locations under the RI and Supplemental RI. This data can be provided on request. The summary tables in Appendix B include the following:

- all compounds/elements for which a Performance Level (PL) exists, as defined in the DOCP, provided the compound has been detected above method detection limits
- the PL as defined in the DOCP
- detections of each compound/element, including all historical sampling data

Complete data tables for the two most recent sampling events under the Post-Closure Environmental Monitoring Plan are included in Appendix C. These tables include all non-detect compounds, serial dilutions performed on any samples, and results of field Quality Assurance/Quality Control (QA/QC) samples. Full CLP laboratory deliverables for all data since 1995 are on file with the EPA. These documents can be provided upon request.

Surface water sampling locations are shown on Figure 3. For evaluation purposes, the surface water samples are sub-divided into the following areas:

1. Upstream sample location (SW-08), located to the north-northeast of the landfill.
2. Marshy Area sample location (SW-18), located downgradient and downslope of the landfill in the toe of slope drainage swale.
3. Unnamed Stream sample locations (SW-15 and SW-04), which includes surface water sample locations downstream of where Swale 1, the Hillside Swale and the toe of slope swale converge.
5. Upstream Barney Brook (SW-06), which evaluates surface water quality upstream of where the Unnamed Stream discharges to Barney Brook.
6. Downstream Barney Brook (SW-05), which is located in Barney Brook, downstream of where the Unnamed Stream discharges to Barney Brook.

4.2.1 *Volatile Organic Compounds*

PL VOCs were not detected in the upstream sample location, SW-08 above method detection limits. PL VOCs detected in the Marshy Area toe of slope swale include TCE and PCE. VOCs detected in the Unnamed Stream above PLs include 1,1-DCE, TCE, and PCE. However, sampling conducted since the landfill closure activities were completed, e.g., the two Demonstration of Compliance/Groundwater Reclassification sampling events, the concentrations of VOCs have been below PLs for all VOCs at both Unnamed Stream sample locations. PL VOCs were not detected above method detection limits in either of the sample locations from Barney Brook.

Seasonal variations in the compounds and concentrations of VOCs in surface water were not observed.

4.2.2 *Inorganics*

Concentrations of inorganics (metals and cyanide) in surface water above PLs are summarized below by area:

- Based on the two most post-closure sampling events, only aluminum is detected above PLs in the upstream sample location SW-08.
- Metals detected in the toe of slope swale above PLs are aluminum, iron, silver, and thallium. During the most recent sampling event the only metal detected above PLs at SW-18 was iron. The PL for iron is 1000 μg/L and the levels of iron ranged from 2500 to 2600 μg/L.
- Metals detected in the Unnamed Stream above PLs are aluminum, antimony, mercury, silver, and thallium. Several of these metals (antimony, mercury and silver) were only detected in a few sampling events prior to 1994. For the two PCEM sampling events the only metals detected above PLs were aluminum and thallium. The PLs for aluminum and thallium are 87 and 1.7 μg/L, respectively. The concentrations of these metals in the Unnamed Stream ranged from 139 to 156 for aluminum and 2.9 μg/L for thallium.
- Metals were not detected in Barney Brook above PLs.

In summary, the only metals detected above PLs in surface water were aluminum, iron and thallium. Seasonal variations in the compounds and concentrations of metals in surface water were not observed.

4.3 CONTAMINANT FATE AND TRANSPORT

This section presents an evaluation of the fate and transport of contaminants identified at the site. This section focuses on groundwater contaminant fate and transport, but also discusses other media (i.e., leachate, surface water etc.), as appropriate. The discussion of contaminant fate and transport is presented in two sections, as follows:

- contaminant mobility and persistence
- contaminant fate and transport

4.3.1 *Contaminants of Potential Concern, Contaminant Persistence, and Factors that Affect Mobility*

Contaminants of Potential Concern

Site-related inorganic and organic contaminants have been detected in environmental media principally in shallow hydrogeologic units (kame sand and ablation glacial till).

The VOCs that were the most prevalent in groundwater and surface water onsite are TCE, PCE, vinyl chloride, 1,2-DCE, and 1,1-DCE. A similar suite of VOCs was also detected in other media, including air, soil, sediments, and surface water.

Based on the results of the EPA risk assessment for the site, inorganics contaminants of concern in groundwater include arsenic, lead, manganese and thallium. Of these, thallium is the only metal detected above VGES in groundwater during the two most recent sampling events.

Physical and Chemical Properties Affecting Mobility

General Properties

The physical and chemical properties of contaminants directly affect their migration through environmental media. The following chemical-specific properties can be indicative of the relative mobility, retardation, and persistence of chemicals in the environment:

- Solubility in Water;
- Vapor Pressure;
- Henry's Law Constant;
- Viscosity and Density/Specific Gravity;

- Soil Adsorption Coefficient (K_{oc}); and
- Octanol Water Coefficient (K_{ow}).

Properties of Chemical Groups Detected

The VOCs of potential concern at the site are predominately chlorinated aliphatic compounds. The most frequently detected VOCs at the site are TCE, PCE, vinyl chloride, 1,1-DCE, and 1,2-DCE. These VOCs are characterized by a relatively high vapor pressure and solubility. The VOCs have aqueous solubilities ranging from 100 mg/l to 10,000 mg/l under specific laboratory conditions. VOCs also have the highest vapor pressures (ranging from 10 mm_{Hg} to 6000 mm_{Hg}) and Henry's Law Constants (0.01 to 0.1 atm-m^3/mol), compared to other compound types. Therefore, they are likely to be the most mobile contaminants.

A variety of inorganics were detected in soil, sediments, groundwater, and surface water at the site. Metals are not readily volatile, tend to adsorb to soils, and are generally insoluble in water under neutral or slightly alkaline conditions. While metals were detected in relatively high concentrations in site leachate and surface water, some of these metals may be associated with suspended sediment in the samples, rather than in a dissolved phase, as neither leachate nor surface water samples were filtered.

Contaminant Persistence

Persistence refers to a contaminant's ability to resist physical, chemical, and biological environmental conditions that tend to reduce its presence. The persistence of contaminants is influenced by the properties described in the previous section as well as molecular structure, site-specific factors such as the characteristics of soil, water, and other media in which contaminants occur, the hydrogeological characteristics of the site, and climactic conditions. .

The VOCs are likely to be the least persistent contaminants in soil. VOCs are relatively water soluble, and may leach from soil to groundwater due to infiltration of precipitation. In both soil and groundwater, but particularly in soil, the VOCs may be transformed through biological reactions. The end product(s) of the biodegradation is dependent on several factors, including pH, temperature, dissolved oxygen content, and nutrient levels. For example, both PCE and TCE can be biologically transformed into dichloro- and monochloro-ethenes or ethanes, and may ultimately be mineralized (CO_2, H_2O, Cl^-, etc.) and converted into biomass.

The daughter products are generally more mobile, and are therefore more likely to be found away from the source of the original contamination. Aromatic compounds such as benzene may also undergo biodegradation, although by different pathways.

Most metals will persist in soils at neutral pH, with the exception of those metal salts that are water-soluble.

Metals are not subject to biodegradation, but may change valence state due to biological or physical processes to become more or less water soluble, thereby affecting persistence.

4.3.2 *Fate and Transport*

Summary of Groundwater Flow

Recharge to the shallow overburden aquifer is primarily through precipitation infiltrating surficial sand and gravel units. Groundwater flow in the kame sand and ablation glacial till is generally from the landfill southeastward into the Marshy Area and southward. Based on site topography, groundwater quality data and groundwater flow direction, contaminant migration in the kame sand and ablation glacial till does not extend beyond the Unnamed Stream or up the slope to Harmon Hill.

Groundwater elevation data indicate generally upward gradients in the kame sand and ablation glacial till in the Marshy Area, with groundwater discharging to surface water. Vertical gradients in the Landfill Area appear to be slightly upward.

Groundwater flow in the bedrock aquifer is towards the west-southwest. Impact from the Burgess Brothers Superfund Site to the weathered and competent bedrock aquifers was not identified.

A dense lodgement till separates the overburden (kame sand and ablation glacial till) from the bedrock. The presence of a dense till between the overburden and generally upward gradients in the overburden indicates that dissolved phase contaminant migration from the overburden into the bedrock is not expected. The lodgement till, as a vertical barrier to migration, is confirmed by bedrock groundwater quality.

According to the RI Report, groundwater in the till and weathered bedrock may discharge to Barney Brook. No impacts from the landfill were observed in residential wells or Ryder Spring downgradient of the landfill. Topographically higher areas, upslope on Harmon Hill, are an area of recharge for the competent bedrock, according to the RI Report. In these areas, the kame sand and till is reportedly absent. According to the RI Report, the competent bedrock may discharge to the Walloomsac River system to the west.

Summary of Contaminant Sources

The primary source area for contaminants at the site is the Landfill Area, and in particular the two Former Lagoon Cells. As discussed above contaminants in the Landfill Area, and particularly the Former Lagoon Cells, consist primarily of VOCs and metals. The primary mechanism of contaminant migration has been surface water infiltration through the Landfill Area, including the Former Lagoon Cells, and subsequent release to groundwater. Once in the groundwater, the contaminants followed the localized flow pattern into the Marshy Area and towards the Unnamed Stream. The landfill and Former Lagoon cells have since been closed and capped; therefore, the primary mechanism of contaminant migration has been eliminated.

Contaminant Migration: Kame Sand/Ablation Glacial Till

VOCs in Soil

VOCs were detected in shallow soils at relatively low concentrations. This is because chlorinated aliphatic compounds present in exposed soils would tend to volatilize to the air. VOCs are detected in subsurface soils in relatively high concentrations (up to 12,600,000 μg/kg at SBW-15), especially in the Former Lagoon Cells, and in the vicinity of SBW-21. Because VOCs tend to have relatively high water solubility, residues in soils may migrate to groundwater.

VOCs were detected in Marshy Area soils. The VOCs detected in soils is likely associated with groundwater entrained in the soil.

VOCs in Groundwater

VOCs detected at the site are denser than water. VOC contaminant migration in groundwater is by dissolved phase transport or volatilization from groundwater to subsurface soils of the vadose zone with subsequent escape to the atmosphere. Separate phase transport as a dense non-aqueous phase liquid (DNAPL), particularly for TCE and PCE, has not been observed.

VOC contaminant migration in groundwater is primarily dissolved phase transport, migrating from the Landfill Area toward the south-southeast into the Marshy Area. The southeastern edge of the VOC plume in the kame sand/ablation glacial till is at the break in slope between the landfill and Harmon Hill. VOCs are not detected in groundwater on Harmon Hill above MCLs or VPES. VOCs were detected slightly above PLs and/or VPES at W-09S1, P-01, and P-02. VOCs were not detected above PLs or VPES at W-30T, indicating that the southern limit of contaminant migration is somewhere between P-01 and W-30T.

Migration of the VOC plume in the south-southeast direction is constrained by discharge of contaminated groundwater to surface water (the Unnamed Stream) and attenuation of contaminated groundwater in Marshy Area sediments. VOCs are not detected above method detection limits at W-28T or W-29T located to the east of the Unnamed Stream.

Limited contaminant migration beyond the landfill is observed towards the west into the West of the Landfill Area. The levels of VOCs detected in wells from this area are lower than observed in the Marshy Area, suggesting that the primary direction of groundwater contaminant migration is toward the Marshy Area. This is consistent with groundwater flow maps for the kame sand and ablation glacial till (Figures 6 and 7). The western edge of the VOC plume is between the landfill road and W-26T.

Time series graphs of VOCs in groundwater for monitoring wells W-04D, W-04T, W-03, W-08S1, and W-09S1, are included as Figures 12, 13, 14, 15 and 16, respectively. These time series graphs show that TCE is the predominate VOC present in groundwater and that the concentrations of VOCs are stable through time.

The stable nature of the contaminant plume over the nine years of sampling supports the appropriateness of a reduced buffer zone in the upgradient and cross-gradient directions and a reduced isolation distance in the downgradient direction.

Figure 3 shows the Area of Contaminated Groundwater and the EPA Compliance Boundary. Groundwater modeling performed during the FS indicates that the extent of impacted groundwater is unlikely to increase, laterally or vertically. The groundwater model indicates that the groundwater plume would reach its maximum extent approximately 2 years after startup of the SVE/air sparge system, i.e., December 2002. The hydraulic gradient in the ablation glacial till is approximately 7 feet per year. The Area of Contaminated Groundwater is based on the April 2001 groundwater analytical data. Therefore, the maximum extent of the groundwater plume would be 14 feet downgradient of the Area of Contaminated Groundwater. After two years, the VOC source in the lagoons should be remediated and the contaminant plume begins to implode. The model indicates that the contaminant plume should be reduced to within the compliance boundary (located within the groundwater reclassification boundary) within eight years.

VOCs in Surface Water and Sediments

Groundwater at the site discharges to surface water in the Unnamed Stream. VOCs in surface water would volatilize or undergo biodegradation or photodegradation. Because VOCs in surface water tend to volatilize rapidly, they are not likely to partition to sediments. The downstream edge of the VOC plume in surface water, as defined by concentrations of VOCs above PLs, is between SW-15 and SW-04.

VOCs were detected in sediment samples from former drainage Swale 2 in the Marshy Area. The concentrations of VOCs detected in groundwater and surface water were generally the same or higher than detected in sediment and a similar suite of VOCs were detected in both groundwater and sediment. Therefore, the VOCs detected in sediment samples appear to be associated with groundwater entrained in the soil particles.

Inorganics in Soil

Metals were detected in Former Lagoon Cell soils at concentrations up to four times background levels and in the Landfill Area at up to two times background levels. Metals detected in lagoon and/or landfill soils, at least one order of magnitude above background levels, included: antimony, cadmium, copper, lead, mercury, nickel, silver, and zinc.

Lead and nickel were detected in Marshy Area soils at up to two orders of magnitude above background. Metals detected in the Marshy Area soils at least one order of magnitude above background levels are cadmium, copper, lead, mercury, nickel, and zinc.

Soils in the Marshy Area are finer grained than the background samples collected from Harmon Hill, under the Phase 1A and 1B RI. This is because the Marshy Area soils are flood plain/overbank deposits from the drainage swales. Concentrations of metals would be higher in the fine-grained fraction of a soil sample than in the coarser sandy material, which is generally more quartz-rich. Therefore, the concentrations of metals detected in Marshy Area soils may be within the range of concentrations expected for this type of soil. However, soil may be locally impacted by leachate seeps from the landfill.

In summary, the metals detected in soils, beyond the Landfill Area and Former Lagoon Cells, may be naturally occurring, associated with the fine grained fraction, or may locally be impacted by leachate seeps.

Inorganics in Groundwater

Metals are generally insoluble in groundwater under neutral or slightly alkaline conditions. Metals can become more soluble under increasingly acidic conditions. Groundwater pH in the kame sand/ablation glacial till at the site ranged from 5.54-9.27, with pH's generally between 6-8, indicating relatively neutral to slightly alkaline conditions. Therefore, metals are not expected to be mobile in groundwater.

A similar suit of metals were detected above MCLs or VPES in groundwater samples from Landfill Area and Marshy Area wells, using conventional sampling techniques, as were detected in soils. None of these metals was detected above MCLs or VPES using low flow sampling techniques. The lateral extent of the metals plume, with the exception of iron, manganese and thallium, is contained primarily within the Landfill Area.

Based on the low flow sampling results the only metals detected in groundwater above ICLs are arsenic, lead, manganese and thallium. In the most recent sampling event the concentrations of these metals have been below ICLs at all groundwater reclassification wells. During the past two sampling events, since closure of the landfill, the only metals detected above ICLs in groundwater have been thallium, which was detected in both upgradient and downgradient wells at similar concentrations. These data suggests that the metals in soils are insoluble and immobile in groundwater. The source of thallium is not known and may be naturally occurring, an artifact of sampling and/or analytical procedures, or from the Landfill or Former Lagoon Cell areas.

Inorganics in Surface Water and Sediment

Historically, concentrations of lead, mercury, nickel, and zinc were detected above NOAA ER-L concentrations in sediments from the Marshy Area. Metals were not detected in the downstream sediment sample locations above NOAA ER-L levels. One location SED -14 has been sampled two times under PCEM. The concentrations of metals at this location were below PLs as defined by Ontario Ministry of the

Environment (MOE) Sediment Quality Guidelines. These data indicate that the extent of impacts to sediment is limited to within the Marshy Area, downslope and downgradient of the landfill. This area is covered with either an impermeable or permeable cap.

The concentrations of metals in surface water above PLs were highest in the Marshy Area and decrease downstream in the Unnamed Stream and Barney Brook. Metals detected above PLs during the last two sampling events, since closure of the landfill, are: aluminum, copper, iron, silver, and thallium. A similar suit of metals were detected in soil samples from the Landfill Area and Former Lagoon Cells, as wells as leachate seep samples. The source of metals in surface water is likely from leachate seeps or naturally occurring. The landfill has been capped and leachate seeps eliminated; therefore, concentrations of metals in surface water should return to background conditions with time.

The impact to surface water quality appears to originate in the Landfill Area and progressively decreases as the stream flows toward Barney Brook. However, aluminum is present at all locations at similar concentrations, copper is present at higher concentrations downstream of the landfill, and the concentrations of thallium are sporadic throughout the swale/stream system. The source of these metals may be background and not related to impacts from the landfill.

<u>Bedrock</u>

Migration of dissolved phase contaminants into the shallow and deep weathered bedrock and competent bedrock has not been observed. Site geology consists of a 35 to 90 foot thick dense lodgement till, situated between the kame sand/ablation glacial till overburden and bedrock. This till is described in drill logs as being dry . It is therefore concluded to be a barrier to vertical migration. The vertical gradient in the kame sand and ablation glacial till is upward, which would also inhibit downward migration of dissolved phase contaminants.

VOC impacts to groundwater above MCLs or VPES are limited to the unconsolidated overburden (kame sand and ablation glacial till). Concentrations of VOCs above MCLs or VPES in bedrock were only detected at two locations, within the shallow weathered bedrock and one location within the competent bedrock. As discussed in Section 4.3.2, the concentrations of VOCs above MCLs or VPES at these locations are not representative of aquifer conditions and probably due to a laboratory or field sampling error.

Metals, with the exception of iron, were not detected in bedrock above PLs, MCLs or CPEs based on representative sample data. While additional metals were detected above MCLs or VPES, these data were determined to be non-representative due to high sample turbidity, poor well construction (i.e., grout penetrating the well screen), and therefore are not used to evaluate contaminant fate and transport. Iron is a common element in bedrock and is likely naturally occurring in bedrock.

7.0 CONCLUSION AND RECOMMENDATIONS

Based on the criteria set forth in the VGPRS Subchapter Four Section 12-403 (a) through (h), the groundwater within the proposed reclassification area shown on Figures 2 and 3 should be reclassified from Class III to Class IV. Class IV groundwater is classified as a suitable source of water for some agricultural, industrial, and commercial use. However, Class IV groundwater is not considered to be suitable as a potable water supply. Reclassification of groundwater to Class IV is consistent with the evaluation criteria for the following reasons:

1. Elevated concentrations of chlorinated VOCs and dissolved metals are present above VGES within the proposed reclassification zone.
2. Groundwater from the proposed reclassification area is not currently used as a public water supply source and has very low potential for ever being considered as a public water supply source for the following reasons:
    - The use of groundwater is prohibited by institutional controls and, therefore, cannot be developed as a public water supply source
    - The majority of the reclassification area is a landfill
    - Extensive groundwater quality data indicate that the overburden aquifer within the reclassification area has been contaminated above the VGES by the Landfill Area and Former Lagoon Cells
    - The overburden aquifer within the reclassification area is of low yield and low saturated thickness and would be inadequate as a water supply source
    - The extent of impact is contained within the groundwater reclassification area and is likely to be contained within that area because of source control measures
3. Groundwater within the reclassification area is unlikely to be beneficially used as either Class III or Class IV. The saturated thickness of the overburden aquifer within the groundwater reclassification area is small and hydraulic conductivities are low. Therefore, groundwater yields from the saturated overburden would be considered to be inadequate for domestic water supply, commercial/industrial, irrigation, or agricultural use.
4. Municipal water supply is available to areas downgradient of the reclassification area.

5. Burgess Brothers owns all of the property within the groundwater reclassification area. This property will likely not be sold, because it is a Landfill Superfund Site, located in an area where uncontaminated property is readily available.

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Environmental
Partners
Group, Inc.

350 Lincoln Street
Suite 216
Hingham, MA 02043

Phone: 781-749-6771
Fax: 781-749-6607

Website:
www.envpartners.com

April 10, 2002

Mr. Ronald C. Jennings
Remedial Project Manager
Office of Site Remediation and Restoration
U. S. Environmental Protection Agency
Waste Management Division – HPS-CAN1
John F. Kennedy Federal Building
Boston, MA 02203-0001

RE: Burgess Brothers Superfund Site - Remedial Action
Operations and Maintenance (O&M) Progress Report
Quarterly Report #4: October 1, 2001 – December 31, 2001

Dear Mr. Jennings:

On behalf of the Burgess Brothers Steering Committee (Steering Committee) and at the direction of the Project Coordinator, *de maximis, inc.*, we are pleased to forward to you this Operations and Maintenance (O&M) Progress Report for the fourth quarter of 2001 for the Burgess Brothers Superfund Site (the Site) in Bennington and Woodford, Vermont. This Report has been prepared in accordance with the requirements of the Statement of Work (SOW) associated with the Consent Decree between the Steering Committee, United States Environmental Protection Agency (EPA) and the State of Vermont Department of Environmental Conservation (VtDEC), and as described in the Post-Closure Operations and Maintenance Plan for the Site dated January 25, 2001. O&M progress reports will continue to be submitted to EPA quarterly for the next year, after which the reports will be issued annually.

This report describes activities related to the maintenance and monitoring of Remedial Actions at the Site between October 1, 2001 and December 31, 2001 and provides the following:

- A summary of the status of the Soil Vapor Extraction (SVE)/air sparge operation.
- The results of an analysis of the remedial action performance, e.g., the SVE/air sparge system performance data and environmental monitoring data.
- A discussion of the condition of the components of the remedy, including the landfill cap, the Marshy Area cap, and the SVE/air sparging system.
- The results of the Fall 2001 environmental sampling event, conducted during November 2001 and consisting of groundwater sampling from seven groundwater

monitoring wells at the site. The sampling program was conducted in accordance with the Site's Post-Closure O&M Plan and the EMP.

- A summary of the O&M activities performed during this quarter and anticipated during the next quarter (January 1 to March 31, 2002).

This summary is provided in the following Sections:

Section 1	O&M Activities Performed During This Period
Section 2	SVE/ Air Sparge System Operation Summary
Section 3	Environmental Monitoring
Section 4	Site Inspection
Section 5	O&M Actions to be Performed During Next Quarter

1.0 O&M Activities Performed During This Quarter

The O&M activities performed between October 1, 2001 and December 31, 2001 consisted of the following:

- Continued operation of the SVE/air sparge system, including related operational and environmental monitoring of the system as required in the O&M Plan. Significant operational and maintenance events that occurred during the quarter consist of the following:
  - General system maintenance, including winterization of select components of the system was completed on October 11 and 12, 2001. The activities included the replacement of weathered and heat stressed sections of PVC piping and the installation of additional exterior pipe supports. The influent piping inside of the building leading from the SVE units to Vessel #1 was also replaced with new PVC pipe. Additionally, an open-sided shed was built around the heat exchange unit outside of the building, providing added weather protection for this unit.
  - Subsequent to receiving EPA approval, the flow meters located at each of the air sparge wells were removed during October 2001.
  - Only one short-term shutdown of the system occurred during this quarter. The shutdown was initially caused by a mechanical problem with SVE Unit #1, which occurred on November 29, 2001. The entire SVE/air sparge system was shutdown from November 29 through December 4, 2001. Between December 4 and December 8, 2001, the system operated with only SVE Unit #2 operating. SVE Unit #1 was repaired on December 8, 2001, and the entire SVE/air sparge system has continued to operate since that date.

- Groundwater sampling was conducted during mid-November in accordance with the O&M Plan and the EMP.
- A site inspection was performed on November 29, 2001 in accordance with the O&M Plan. There were no 50-year storm events (defined as 5.3-inches of rainfall over a 24-hour period as reported for Bennington, Vermont by the U.S. National Weather Service) during this period, and therefore no additional site inspections were required to confirm the integrity of the landfill capping system as a result of such an event.

2.0 SVE/Air Sparge System Operation Summary

Between October 1, 2001 and December 31, 2001 the system operated for a total of approximately 2,100 hours. Combined with the first three quarters of 2001, the system has operated for an estimated total of 7,650 hours since operations began on January 4, 2001.

During the fourth quarter of 2001, the system continued to operate with extraction wells VW-1, VW-5 and VW-6 fully open to maximize the effect on areas within the Former Lagoon Cells that have had the highest detected concentrations of volatile organic compounds. VW-1, VW-5 and VW-6 are located within former Cell #2. Extraction well VW-3 remained partially open during this period to ensure that the former Cell #1 area remained under vacuum. With this extraction well configuration, the system continued to generate a sustained flow rate of approximately 110 cubic feet per minute (cfm) with both SVE Units #1 and #2 operating.

System operational monitoring is performed a minimum of once per week in accordance with the O&M Plan. This includes monitoring of the extraction well system to determine vacuum and pressure readings within the well field, inspections of the mechanical equipment, and monitoring of the extracted and treated air streams using a photoionization detector (PID) and field GC. A summary of the weekly GC operational data through the end of this period is provided as Table 1. This data includes the PID screening results and the field GC results. The chromatograms generated by the GC during this monitoring period are being provided to the EPA under separate cover.

2.1 Extraction Well Field Monitoring

Operational monitoring of the extraction well system consists of weekly pressure/vacuum measurements of the monitoring wells located within and at the perimeter of the former Lagoon Area. Weekly inspection logs, which provide information about the operation of the system, are provided as Attachment A.

2.2 Mechanical Equipment Operation

One mechanical shutdown occurred during the quarter. The problem encountered and measures taken to address the problem during this period is:

- On November 29, 2001, the circuit breaker for SVE Unit #1 tripped, shutting down Unit #1. Environmental Partners personnel, who were onsite when Unit #1 shutdown, reset the circuit breaker and attempted to restart the unit. After a number of attempts to restart the unit, Environmental Partners shut down the entire SVE/air sparge system as a precautionary measure and contacted Hart Electric of Bennington, VT to determine the cause of the shutdown.

  Hart arrived onsite on December 4, 2001 and determined the cause of the shutdown to be due to an unbalanced impeller in SVE Unit #1. The system was restarted on December 4, 2001, excluding SVE Unit #1, which remained shutdown until December 8, 2001 when Hart cleaned the unit and repaired the impeller. The entire SVE/air sparge system has continued to operate normally since December 8, 2001.

2.3 Treatment System Monitoring

Operations monitoring of the SVE/air sparge treatment system included monitoring total VOC concentrations influent to Vessel #1 and VOC concentrations at the discharge of Vessels #1 – #6 using a PID. This data is summarized on the weekly inspection logs, provided in Attachment A.

After determining where breakthrough had occurred within the carbon treatment train based on the PID results, the field GC was used to analyze the effluent air stream from those vessels that did not exhibit breakthrough. At a minimum, the discharge from Vessel #5 and Vessel #6 (the discharge vent) were analyzed weekly as required by the EMP. At no time was there a discharge from Vessel #6 that exceeded the air quality standards. The additional GC data was collected from vessels upstream of Vessels #5 to provide more detailed information regarding system operation and the breakthrough patterns of the individual VOC compounds (vinyl chloride, trichloroethylene (TCE), and tetrachloroethylene (PCE)) in the air stream.

Summary log sheets that provide the results of the GC analyses performed during the quarter are provided in Attachment B. Copies of the GC chromatograms are being provided to EPA under separate cover.

Influent VOC Concentration Trends

The SVE/air sparge system has been effective in the removal of VOCs from the extracted air. Figure 1 shows the influent VOC concentrations in the extracted air stream since system startup on January 4, 2001.

Since June 6, 2001 the SVE/air sparge system has operated with extraction wells VW-1, VW-5 and VW-6 fully open and well VW-3 partially open (wells VW-2 and VW-4 have remained closed). This well configuration was selected based on a detected steady decrease in influent concentrations to the system during the second quarter 2001 (Table 1) and monitoring data from individual extraction wells (Table 2). With this well configuration, influent VOC concentrations have ranged from greater that 2,000 ppm to approximately 1,600 ppm during the fourth quarter of 2001.

Estimated Mass of VOCs Removed from the Lagoon Area

An estimate of the mass of VOCs removed from the former Lagoon Area through the operation of the SVE/air sparge system was developed using the system operating flow rate and the influent VOC concentrations detected. Calculations of the mass of VOCs removed on a monthly basis through the end of the quarter are provided in Attachment C. These calculations were performed using the procedures and assumptions used to estimate the total mass of VOCs in the former Lagoon Area, presented in the Feasibility Study that was developed for the Site.

Based on these calculations, it is estimated that a total of approximately 25,800 pounds of VOCs have been removed from the former Lagoon Area by the SVE/air sparge system since system startup through the end of the fourth quarter 2001. This includes the initial system shakedown period during December 2000.

Carbon Vessel Monitoring

Carbon vessel monitoring has been performed using both a PID and GC on a weekly basis. The results from both instruments are summarized on Table 1. The GC results indicate that, during the early part of the fourth quarter, vinyl chloride had continued to be the first of the three compounds of concern to break through a carbon vessel. Low concentrations of vinyl chloride (less than 1 ppm) were generally detected with the GC before breakthrough was observed with the PID. The data further indicated that the carbon was providing essentially complete capture of the TCE and PCE, with breakthrough of vinyl chloride occurring at a very low rate (approximately 0.5 ppm).

Toward the end of the quarter, the concentration trends changed, with concentrations of PCE detected in the effluent from the vessels before vinyl chloride or TCE. This trend continues to be observed, and is further indication that the air sparge/SVE system is effectively removing residual VOCs. During the fourth quarter, levels of vinyl chloride, TCE and PCE detected in the effluent from Vessels #4, #5 and #6 never exceeded the established PALs for those compounds and breakthrough of Vessel #6 was never detected for any compound.

2.4 Carbon Usage Rates

Since the system startup on December 13, 2000, a total of 50,000 pounds of activated carbon has been replaced in the treatment train. During the fourth quarter the carbon usage was 12,000 pounds, with changeouts taking place on October 25 and November 29, 2001. Carbon usage rates were estimated to be approximately 150 pounds per day during the fourth quarter 2001, which is consistent with the estimates for all three previous quarters of 2001.

2.5 Condensate Collection and Sampling

Approximately 100 gallons of condensate was generated by the SVE system through the end of 2001. Two 55-gallon drums containing the condensate were collected by Clean Harbors, Inc. on January 30, 2002 for transport to the ENSCO incinerator in Arkansas for disposal.

3.0 Environmental Monitoring

Environmental monitoring conducted during this quarter consisted of:

- November 2001 Groundwater Sampling
- Environmental Monitoring of the SVE/Air Sparge System

A summary description of these sampling activities is provided below.

3.1 November 2001 Groundwater Sampling

As required under the Demonstration of Compliance Plan (DOCP), a second Post-Closure Environmental Monitoring (PCEM) event was completed during November 2001. The sampling event was completed in accordance with the Post-Closure O&M Plan and related EMP and QAPP. A letter report summarizing the sampling activities and the results is provided as Attachment D.

Environmental Partners is in the process of performing the required data validation of the groundwater sampling results. When the validation is completed, the results will be forwarded to EPA under separate cover.

3.2 Environmental Monitoring of the SVE/Air Sparge System

Environmental monitoring of the SVE/air sparge system is described in Section 2 and consists of effluent discharge monitoring of Vessels #5 and #6 in accordance with the Standard Operating Procedures described in the EMP and QAPP. The results of this environmental monitoring program are provided in Attachments A and B and are summarized in Table 1. This environmental monitoring demonstrates that the activated carbon treatment system is effectively removing VOCs from the extracted air stream. Breakthrough of Vessel #6 was never detected.

4.0 Site Inspection

This section provides a summary of observations made during the fourth quarter 2001 site inspection, performed on November 29, 2001. The completed Site Inspection Form is provided in Attachment E. A summary of the inspection is provided below.

Vegetative Growth
Dense vegetation was observed over the entire landfill cap. No areas of abnormally stressed vegetation were noted.

Ground Surface
No settlement, holes, cracking, erosion or breakouts were observed on the landfill cap. In addition, no signs of trespassing were observed.

Storm Water Management System
All of the swales were observed to be stable and functioning. No obstructions, damage or excessive plant growth were observed within the swales or at the discharge from any of the site culverts.

Sediment was removed from the sediment trap located in the Hillside Diversion Swale, and from the northern toe-of-slope swale during the fourth quarter 2001. The sediment had not been excessive in these areas however, and the removal was completed as a preventative maintenance activity.

Groundwater Monitoring Wells
The following minor repair was made to groundwater monitoring well W25S1:

Well Number	Identified Problem	Corrective Action Taken
W25S1	Missing lock	New lock added

During the first quarter 2002, a new hinge and latch will be installed on the well casing at well W01B to replace the existing rusted equipment.

Gas Vents
The gas vents are in good condition. No signs of breaks, bending or crimping were observed and the vent screens were in place.

Access and Security
The gravel access roads to the site, including the road to the SVE system treatment building were passable and kept in good condition. No sign of damage to the chain link fence that surrounds the Site was observed. All gates were locked and no damage to the gates was observed and signs were visibly posted on all gates.

SVE/Air Sparge System
All above ground piping associated with the SVE/Air Sparge are in good condition. No signs of breaks, excessive bending or crimping were observed. The treatment building is also in good condition, with no sign of weather related damage or vandalism.

Permanent Monuments
The concrete boundaries, identified as Bounds #1 and #2 on the Site Plan, are in good condition.

5.0 O&M Activities to be Performed During Next Quarter

The following O&M activities are scheduled to occur during the next quarter of the RA operations:

- Continued operation of the SVE/Air Sparge system and related operational and environmental monitoring
- The next site inspection will be performed during March 2002, or after a significant weather event.
- Removal of accumulated sediment in the stormwater management structures, as necessary.
- Disposal of condensate generated during the SVE/air sparge operations.

We hope that this information is helpful in your review of the attached data and provides a satisfactory overview of the O&M activities during this period. If after your review of this information you have any questions, please feel free to contact Clayton Smith at *demaximis, inc.* at (781) 642-8775.

Sincerely,

Mark N. White
Principal

Kevin E. McHugh
Project Manager

Attachments:

Figure 1	SVE/Air Sparge System Influent VOC Concentrations
Table 1	Summary of SVE/Air Sparge System Monitoring
Table 2	Summary Individual Extraction Well Total VOC Concentrations: January through December 2001
Attachment A	Weekly Inspection Logs of SVE/Air Sparge System
Attachment B	SVE/Air Sparge System Monitoring - Field GC Data Logs
Attachment C	Monthly Estimates of VOCs Removed
Attachment D	November 2001 Groundwater Sampling Report
Attachment E	Site Inspection Form

Distribution:

Ron Jennings, EPA (4 copies, with attachments and Chromatograms)
Gerold Noyes, VtDEC (1 copy, with Attachments A through E)
Geoff Seibel – *de maximis, inc.* (1 copy, with Attachments A through E)
Clayton Smith – *de maximis, inc.* (1 copy, with Attachments A through E)
Tom Houser, Eveready (1 copy, with Attachments A through E)